PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH COLUMBIA

A Reconnaissance Survey Of Le Moray Lake #2

A. R. Langston and A. R. McLean
1998

PWFWCP Report No. 135

105-02890/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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A RECONNAISSANCE SURVEY OF

LE MORAY LAKE #2*

WATERSHED:	Pine River
DATE OF SURVEY:	July 29,30, 1992
FIELD CREW LEADER:	A.R. McLean
FIELD ASSISTANT:	M. Hunter

PEACE/WILLISTON FISH AND WILDLIFE

COMPENSATION PROGRAM

B. C. HYDRO

and

MINISTRY OF ENVIRONMENT, LANDS AND PARKS

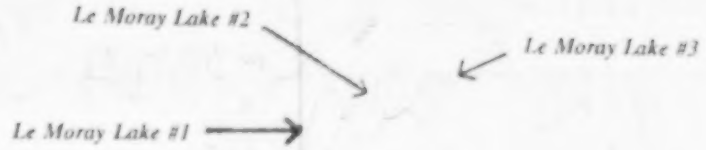
REPORT PREPARED BY: A.R. Langston and A.R. McLean

RELEASED BY: _____

Nick Baccante, Regional Fisheries Biologist

*Le Moray Lake #2 is an unofficial name registered with the Geographical Names Unit of the Ministry of Environment, Lands and Parks.

FOOTHILLS
Le Moray Lakes
Scale 1:250 000 Echelle
Miles 5
Kilometres 5



Scale 1:50 000 Échelle

LAKE: Le Moray #2 **SYSTEM NAME: Unnamed C.**

A.S.A.P. REFERENCE NO.: **SYSTEM NO: 234-8120-254-000**

DATA ON FILE FOR THIS SURVEY

Location	x	Dissolved 02/Temp. Profiles	x
Physical Data	x	Winter Dissolved 02/Temp. Profiles	x
Bench Mark	x	Netting Record	x
Terrain Features	X	Lake Catch Summary	x
Access	X	Individual Fish Data	--
Resorts and Campsites	x	Fish Preserved	--
Other Developments	x	Stomach Analysis	--
Obstructions and Pollutions	X	Scale Reading	--
Special Restrictions	x	Location of Inventory Sites	x
Aquatic Plants	x	Photograph Directory	x
Wildlife Observations	x	Appendices:	
Miscellaneous Comments	x	A: Water Chemistry Analysis	x
Lake Drainage	x	B: Tributary Stream Data	x
Fisheries Management Comments	x	Bathymetric Map Reduction	x
History of Previous Surveys	X	Bathymetric Map	x
Water Chemistry Summary	X		

LOCATION

Location:	60 km southwest of Chetwynd		
Elevation:	1390 m +/-		
Latitude/Longitude:	55°28'00":122°29'30"	U.T.M.:	10.5321.61466
Management Unit:	7-22	N.T.S. Map No.:	93-0/8

Drainage: Unnamed C. --> Le Moray Lake #1 --> Unnamed C. --> Mountain C. --> Pine R. --> Peace R.

PHYSICAL DATA

Lake Drainage Area:	--	km^2	Volume:	505000	m^3
Water Surface Area:	90000	m^2	Flushing Rate:	--	
Area above 6 m contour:	50700	m^2	Perimeter of Islands:	--	m
Shoreline Perimeter:	2000	m	Number of Islands:		0
Maximum Depth:	15.0	m	Mean Depth:	5.6	m
Filterable Residue (TDS):	48	mg/l	Secchi Reading:	8.0	m

Sounding Device: Lowrance X-1 5 Elevation Source: Contour interpolation

BENCHMARK

(Iron spike, center of red circle) located at the east shore (near inlet #1), in a 33 cm diameter spruce tree, 2.0 m from shore. Benchmark is set 2.0 m above current water level.

High water mark: Lake appears to be a maximum pondage.

TERRAIN FEATURES

Immediate Shoreline:

Shoreline slope is generally steep, with the exception of the low sloping north and south ends. Le Moray Lake #2 is treed to lake's edge with spruce, subalpine fir and hemlock. A fringe of bog willow and sparse quantities of wild flower and horsetail front the shoreline. Shoreline substrate primarily consists of organics, large cobble and boulders, with small quantities of small cobble intermixed throughout. Lake bottom drops off sharply with the exception of the low sloping north and south ends. Boating access from shore to lake is best suited to the low sloping north and south ends. Boating access from lake to shore is good.

Surrounding Country:

Le Moray Lake #2 is nestled in the rugged Rocky Mountains. The lake is surrounded by mountainous terrain with a mature forest cover consisting of spruce, subalpine fir and hemlock. Scenic mountain views are available to the east and west.

Le Moray Lake #2 is located in the Engelmann spruce-subalpine fir biogeoclimate zone.

ACCESS

Directions:

Le Moray Lake #2 is approximately a 15 minute helicopter flight from Silver Sands Lodge, which is located 70 km west of Chetwynd on Highway 97.
No ground access to the lake was observed.

Road Type and Conditions:

None.

Restrictions:

None noted.

RESORTS AND CAMPSITES

None, however a campsite may be best suited to the low sloping north or south ends.

OTHER DEVELOPMENTS

None noted.

OBSTRUCTIONS AND POLLUTIONS

A cascade (1.8 m drop over 4.0 m) is present approximately 95 m upstream from the lake on inlet #1. Fish passage would be very difficult, but remotely possible during high flows. Subterranean flow obstructs both upstream and downstream fish passage approximately 116 m upstream of the lake on inlet #1, at present water levels. There are no barriers to fish passage between Le Moray Lakes #1 and #2. Definite barriers to upstream fish passage are located 700 m downstream from Le Moray Lake #1. Numerous other falls and cascades are present on the outlet of Le Moray Lake #1 and Mountain C. (as derived from NTS Map No. 93-0/7, edition 3), some of which may be barriers to upstream fish passage.

SPECIAL RESTRICTIONS:

None noted.

AQUATIC PLANTS

Anacharis sp. was noted in low concentrations along the south shore.

Potamogeton sp. was sparsely located along the lake shore.

No samples were collected.

WILDLIFE OBSERVATIONS

2 water fowl (same species)

1 grouse

MISCELLANEOUS COMMENTS

Low concentrations of Gammarus noted in lake.
Inventories have been conducted on Le Moray Lakes #1 and #3.

Temperature drops off sharply at 6.0 m. This could indicate limited mixing/turnover. However, hydrogen sulphide was not detected.

Bathymetric map: The lake outline is from an enlargement of aerial photograph BC 7188 No. 59, flown June, 1969.

LAKE DRAINAGE

General:

Le Moray Lake #2 has 4 inlets (3 seasonal) and 1 outlet. The inlet creek flows west 125 m and drains Lemoray Lake #3. The outlet creek flows 28 m west to Le Moray Lake #1. The creek then flows 3.5 km southwest to Mountain Creek. Mountain Creek flows north 8.5 km to its confluence with the Pine River.

Major Systems:

None.

Minor Systems:

Unnamed C. - Inlet #1

Inlet #1 drains from Le Moray Lake #3 into Le Moray #2 on the east shore of the lake. The entire length (approx. 125 m) of the inlet was investigated. Approximately 30 m upstream from the lake, the creek had an average wetted width of 2.0 m, average depth of 0.2 m, average gradient of 0.2% and a water temperature of 13°C. Approximately 75 m upstream from the lake, the creek had an average wetted width of 0.5 m, average depth of 0.1 m and an average gradient of 7.5%. The inlet affords no spawning habitat, but fair rearing habitat throughout (undercut banks, overstream vegetation). A cascade (1.8 m drop over 4.0 m) is present approximately 95 m upstream from the lake. Subterranean flow was noted approx. 116 m upstream from the lake.

See point sample cards for additional information.

Unnamed C. - Intermittent Inlet #2

This inlet affords no fisheries potential due to subterranean flow.

Unnamed C. - Intermittent Inlet #3

The initial 150 m of the inlet was investigated. Draining into the south end of the lake, this inlet had an average wetted width of 1.3 m, average depth of 7 cm, average gradient of 2% and a water temperature of 7°C, approximately 10 m upstream from the lake. Fair spawning and rearing habitat was noted throughout the inlet.

See point sample card for additional information.

Unnamed C. - Intermittent Inlet #4

Due to time constraints, only the initial 20 m of this inlet was investigated. Draining into the south end of the lake, the creek had an average depth of 15 cm, average wetted width of 1.0 m and at water temperature of 10°C. Moderate spawning and rearing habitat was noted.

Unnamed C. - Outlet

The outlet drains from the southwest shore of Le Moray Lake #2 to Le Moray Lake #1. This outlet had an average wetted width of 1.5 m, average depth of 20 cm and a length of 28 m. The outlet, overgrown with bog willow, affords very poor salmonid spawning and rearing habitat.

FISHERIES MANAGEMENT COMMENTS

Two overnight net sets and two minnow traps yielded no fish. The lake is therefore believed to be barren of all fish species. Obstructions to fish passage are present at 95m and 11 6m upstream from the lake on inlet #1. Further upstream fish passage barriers are located downstream of Le Moray Lake #1. Inlet #1 has no spawning habitat, but fair rearing habitat. Intermittent inlets #3 and #4 afford fair to moderate spawning habitat. The outlet affords very poor salmonid spawning and rearing habitat. Le Moray Lake #2 is connected to Le Moray Lake #1 and Le Moray Lake #3. Gammarus were noted in the lake (qualitative observations suggest low concentrations). Oxygen samples taken during the winter of 1991 /92 appear suitable for supporting a fish population.

This subalpine lake is suitable for a sportfish introduction. The outlet stream is not believed to be a barrier to downstream fish migration, therefore, potential impacts on native fish species in the Pine River drainage should be considered, if this lake is stocked. The cold water temperatures of this lake would likely result in a "stunted" population if species like rainbow trout are introduced. No ground access to the lake was observed. Potential exists for flow consolidation, stream clearance and spawning habitat improvements on inlet #1. Spawning habitat improvement and stream clearance are also possible on the outlet, pending access and fish introductions. Management considerations for Le Moray Lake #2, should include Le Moray Lakes #1 and #3.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

An oxygen/temperature series was collected on March 3, 1992 by A.R. Langston and A.R. McLean, Peace Fisheries Compensation Program, Prince George, B.C.

Other Related Surveys:

None known.

WATER CHEMISTRY SUMMARY Limnology Station No. 1

Field Conditions:

Date:	July 30, 1992		
Time:	1300 hrs	Air Temperature:	17°C
Wind Velocity:	10-12 km/hr	Wind Direction:	south southwest
Cloud Cover:	0/10 o.c.	Surface Condition:	ripple
Secchi Disc:	8.0 m	Water Colour:	clear

Method(s) Used:

Dissolved Oxygen:	YSI model 58 oxygen/temperature meter
Water Temperature:	YSI model 58 oxygen/temperature meter
Air Temperature:	Hand-held alcohol thermometer
Ph (field):	Digital pH pocket tester
H2S (field):	Hach H2S field test kit
Laboratory Used:	Zenon Environmental Inc. B.C. Laboratory Services
Water Sampler:	Verticle Alpha Water Bottle (Vandorn)
Substrate Sampler:	Substrate sample not taken

Water Sample Chemistry: SEAM Site No.: Not determined.

	Sampling Depths	
	Surface (0 m)	Lower (12.0 m)
pH (field)	8.7	8.0
pH (lab)	7.4	7.2
Specific Conductance (lab)	61 umhos/cm	83 umhos/cm
Filterable Residue 105°C (lab)	48 mg/l	196 mg/l
H2S (field)	-- mg/l	0 mg/l

Bottom Depth:	12.8 m
Substrate Sample Depth:	-- m

Note: Lab ph analyzed outside of optional time frame.

Lake: Le Moray (#2)

OXYGEN/TEMPERATURE DATA

SUMMER

Crew: A.R. McLean
M. Hunter
Date: July 30, 1992

DEPTH (m)	02 (mg/1)	TEMP (°C)
Surface	9.0	13.6
1.0	9.6	13.6
2.0	9.8	13.5
3.0	9.8	13.1
4.0	10.1	12.9
5.0	11.0	11.1
6.0	11.7	6.5
7.0	10.2	5.2
8.0	9.0	4.3
9.0	8.4	4.0
10.0	7.4	3.7
11.0	6.0	3.5
12.0	1.6	3.2
12.8	Bottom	

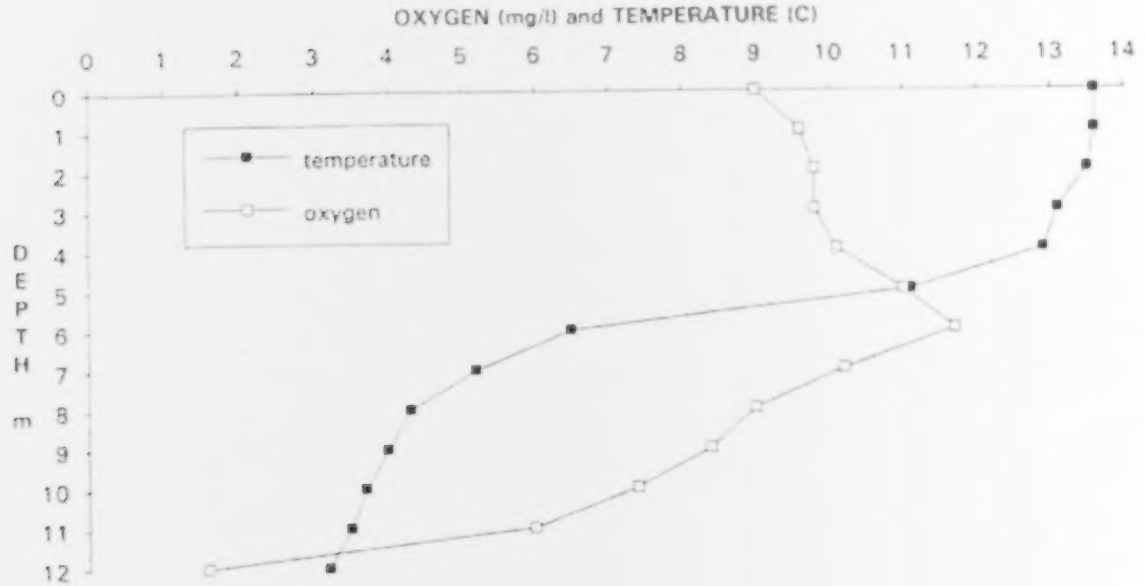
WINTER

Crew:	A.R. Langston
	A.R. McLean
Date:	March 3, 1992
Snow depth:	2.0 cm
Ice Depth:	78 cm

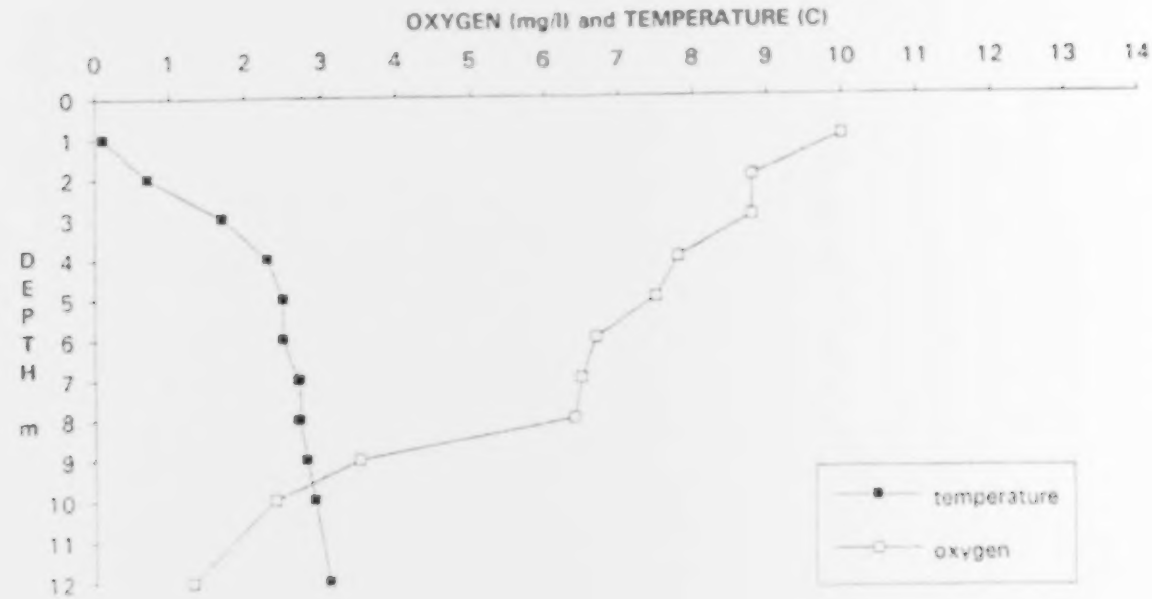
DEPTH (m)	02 (mg/1)	TEMP (°C)
* Surface		
1.0	10.0	0.1
2.0	8.8	0.7
3.0	8.8	1.7
4.0	7.8	2.3
5.0	7.5	2.5
6.0	6.7	2.5
7.0	6.5	2.7
8.0	6.4	2.7
9.0	3.5	2.8
10.0	2.4	2.9
12.0	1.3	3.1
13.5	Bottom	

* Surface is referenced from top of ice, i.e. surface = top of ice.

SUMMER OXYGEN/TEMPERATURE PROFILES



WINTER OXYGEN/TEMPERATURE PROFILES



NETTING RECORD

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	July 29, 1992	Time:	1700 hrs
Date Lifted:	July 30, 1992	Time:	1 1 15 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4
Shallow End Mesh Size:	25 mm	Depth	1.5 m cobble/fines
Deep End Mesh Size:	64 mm	Depth:	10 m
		Substrate:	organics

NETTING SITE #2:

Type:	Sinking monofilament		
Date Set:	July 29, 1992	Time:	1715 hrs
Date Lifted:	July 30, 1992	Time:	1 145 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4
Shallow End Mesh Size:	25 mm	Depth:	0.8 m
		Substrate:	fines
Deep End Mesh Size:	64 mm	Depth:	12 m
		Substrate:	organics

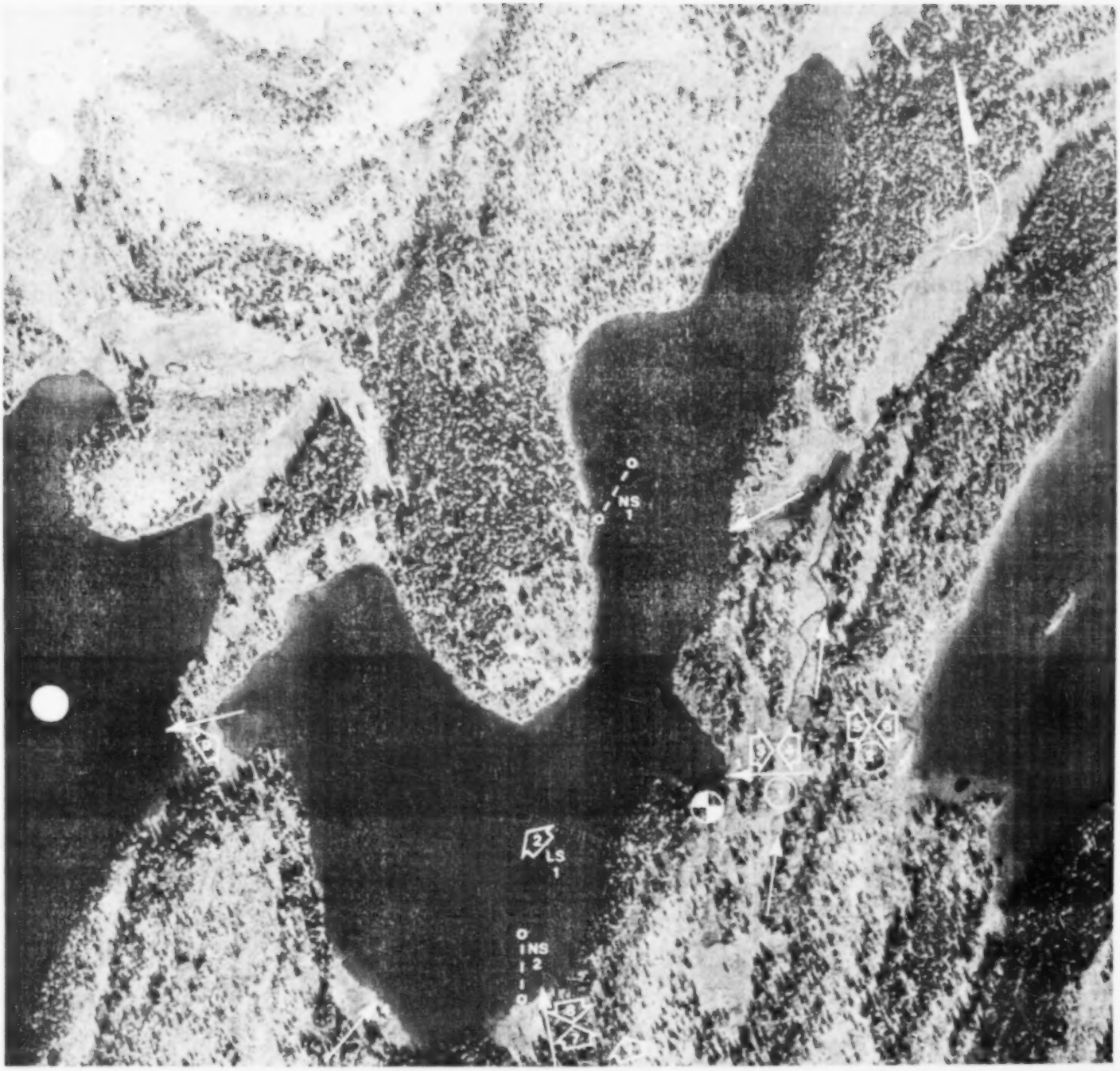
LAKE CATCH SUMMARY

No fish netted.

Minnow Traps:

BAIT: Sardines

#	HOURS	DEPTH (m)	SUBSTRATE	SPECIES	SIZE RANGE (cm)
1	20.75	1.1	fines	2 beetles	
2	21.75	0.5	fines	nil	



LOCATION OF INVENTORY SITES

Figure 1

Lake: Le Moray #2

Reference No.: B.C. 80964:004

Reference Date: August 1980

Scale: 1:3436

1 Plate number, area, and direction

2 Point sample, number, and location

Bench mark

LS 1 Limno station location and number

NS 1 Netting site location and number

1 Stream flow direction and number

PHOTOGRAPH DIRECTORY

Negative #	Plate #	Description
R8:13	1	Aerial view (looking north) of Le Moray Lake #2 (centre), located between Le Moray Lake #1 (left) and LeMoray Lake #3 (right).
R8:7,8,9	2	Panoramic view looking northwest, taken from limno station.
R7:9A	3	Upstream view of point sample site #1, on inlet #1, taken approx. 30 m upstream from lake.
R7:1 1 A	4	Downstream view of point sample site #1 on inlet #1, taken approx. 30 m upstream from lake.
R7:7A	5	Upstream view of point sample site #2, on inlet #1, taken approx. 75 m upstream from lake.
R7:14A	6	Downstream view of point sample site #2, on inlet #1, taken approx. 75 m upstream from lake.
R8:5	7	Downstream view of inlet #3, taken approx. 10 m upstream of lake.
R8:6	8	Upstream view of inlet #3, taken approx. 10 m upstream of lake.
R8:4	9	Upstream view of outlet, taken approx. 15 m downstream of lake.

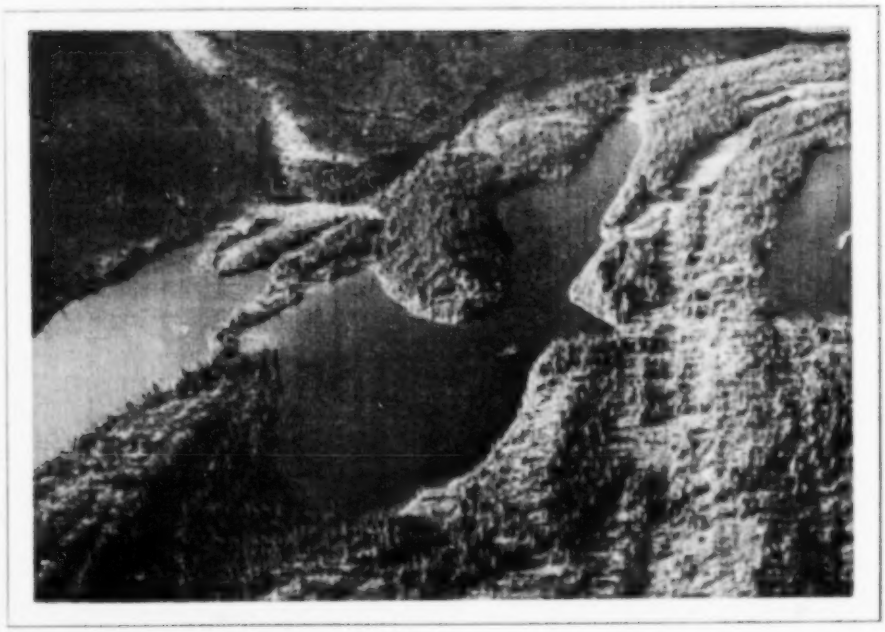


Plate #1: Aerial view (looking north) of Le Moray Lake #2 (centre), located between Le Moray Lake #1 (left) and Le Moray Lake #3 (right).

Plate 2: Panoramic view looking northwest, taken from limno station.

Plate 3: Upstream view of point sample site #1, on inlet #1 taken approx. 30 m upstream from lake.

Plate 4: Downstream view of point sample site #1 on inlet #1, taken approx. 30 m upstream from lake.

Plate 5: Upstream view of point sample site #2, on inlet #1, taken approx. 75 m upstream from lake.

Plate 6: Downstream view of point sample site #2, on inlet #1, taken approx. 75 m upstream from lake.

Plate 7: Downstream view of inlet #3, taken approx. 10 m upstream of lake.

Plate 8: Upstream view of inlet #3, taken approx. 10 m upstream of lake.

Lake: Le Moray (#2)

Plate 9: Upstream view of outlet, taken approx. 15 m downstream of lake.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

Appendix B

TRIBUTARY STREAM DATA

System Name: **Unnamed C.** **inlet #1**

System No.:

Site Location: Sample Site #1, approx. 30 m upstream from lake.

Date:	July 28, 1992	Time:	1 100 hrs
Channel Width:	2.5 m	Water Temp.:	13 °C
Wetted Width:	2.0 m	Stage (flow)	moderate
Max. Depth:	30 cm	Velocity:	no noticeable flow
Avg. Depth:	20 cm	Field Gradient:	0.2 %
Turbidity:	30 cm	Colour:	clear

Flood Signs:

Height: 30 cm

Type: --

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
25%	-- %	-- %	20%

Boulder	Bedrock
55%	--%

Substrate Compaction: low Sand: 0%

Banks:

	Form	Height	Stability
Right	straight	0.3 m	stable due to rooted vegetation
Left	straight	0.4 m	stable due to rooted vegetation

Comments:

Field gradient measured over 10 m.

No spawning habitat available.
Fair juvenile rearing habitat throughout (overstream vegetation, undercut banks).

System Name: **Unnamed C.** **inlet #1**

System No.:

Site Location: Sample Site #2, located 75 m upstream from the lake.

Date:	July 28, 1992	Time:	1 120 hrs
Channel Width:	1 m	Water Temp.:	13°C
Wetted Width:	0.5 m	Stage (flow)	moderate
Max. Depth:	17 cm	Velocity:	0.33 m/sec
Avg. Depth:	10 cm	Field Gradient:	7.5 %
Turbidity:	17 cm	Colour:	clear

Flood Signs:
Height: n/a
Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
5%	20%	30%	40%

Boulder	Bedrock
5 %	--%

Substrate Compaction: moderate Sand: 0%

Banks:

	Form	Height	Stability
Right	straight	0.2 m	stable due to rooted vegetation
Left	straight	0.2 m	stable due to rooted vegetation

Comments:

Field gradient and velocity measured over 3 m.
No spawning habitat available.
Poor rearing habitat at sample site (high velocity), but fair rearing habitat in general (overstream vegetation).

System Name: **Unnamed C.** **inlet #3**

System No.:

Site Location: Sample Site #1, approx. 10 m upstream from lake.

Date:	July 29, 1992	Time:	1315 hrs
Channel Width:	0.8 m	Water Temp.:	7 °C
Wetted Width:	1.3 m	Stage (flow)	moderate
Max. Depth:	10 cm	Velocity:	0.17 m/sec
Avg. Depth:	7.0 cm	Field Gradient:	2 %
Turbidity:	10 cm	Colour:	gin clear

Flood Signs:

Height: 10 cm

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
26 %	37 %	37 %	--%

Boulder	Bedrock
--%	--%

Substrate Compaction: moderate Sand: 85%

Banks:

	Form	Height	Stability
Right	straight	0.16 m	stable due to rooted vegetation
Left	straight	0.12 m	stable due to rooted vegetation

Comments:

Field gradient measured over 9 m.

Velocity measured over 1.0 m.
Fair spawning and rearing habitat noted throughout the inlet.

INSET MAP

SURVEYED BY A.P. MILLAN DATE

OUTLINE SOURCE AIRPHOTO OF BOOM FOR LAKE #3

STATISTICS AT TIME OF SURVEY

ELEVATION	m
SURFACE AREA	m
AREA ABOVE 6m CONTOUR	m
VOLUME	m
MEAN DEPTH	m
MAX. DEPTH	m
PERIMETER, MAIN SHORE	m
PERIMETER, ISLANDS	m
BENCH MARK HEIGHT ABOVE WATER LEVEL	m

Province of British Columbia
Ministry of

FISHERIES BRANCH
INVENTORY OPERATIONS

LE MORAY LAKES(#2)

DEPTHS IN METERS

MAP	FAM DWG	REV DATE
PLOTTING	FAM DWG CHECK	SCALE 1:1700
CONTOURS	DRAFT DATE	
CALCULATIONS	APPROVED	MAP NO. 930/8
FIELD CHECK		

Reduced to
80%
of Original